of a rupee, and perhaps from one-eighth to one-fourth inch high, are very pretty objects, and from their bright colour easily catch the eye.

Cremastogaster Rothneyi, Mayr.

This pretty little species, which was described from specimens taken in the Eden Gardens, Calcutta, also occurs in Barrackpore Park, but does not appear to be generally common in Bengal; it frequents the trunks of trees, but I never succeeded in finding the nest.

The Mushroom Ant.

There is a species, one of the *Poneridæ,* the males of which come in numbers to light, and settle on the white cloth at dinner-time, or fly about the lamps; it is common from the beginning of the hot weather in March to the beginning of the cold season in November, but I have never been able to find either the workers or females to which it belongs,—that is *knowingly.* From the very strong smell which it has when handled, and which exactly resembles mushrooms, I have given it the above MS. name.

A LIST OF THE VENOMOUS SNAKES OF NORTH KANARA; WITH REMARKS AS TO THE IMPERFECTIONS OF EXISTING RECORDS OF THE DISTRIBUTION OF SNAKES, AND FACTS AND STATISTICS SHOWING THE INFLUENCE OF *ECHIS CARINATA* ON THE DEATH-RATE OF THE BOMBAY PRESIDENCY.

By Mr. G. W. Vidal, C.S.

(*Read at the Society's Meeting on 9th January* 1890.)

The recent contribution to the Society's Museum of a specimen of *Trimeresurus trigonocephalus* from North Kanara adds another species to the comparatively long list of venomous land snakes, of whose occurrence in that district there is already an authentic record.

The list now comprises 9 species, as under:—

No.	Name of Species.	By whom recorded and where deposited.
1	*Naja tripudians*, the Cobra	Specimens deposited in the Karwar Museum.
2	*Ophiophagus elaps*, the Hamadryad.	(1) Live specimen sent to the Society's Rooms by Mr. H. T. Ommanney, C.S.; (2) skins contributed by Col. Peyton deposited in Society's Museum.
3	*Bungarus cœruleus*, the Krait ...	(1) Preserved specimen deposited in the Karwar Museum; (2) specimen contributed to the Society's Collection by Mr. H. S. Wise.
4	*Callophis nigrescens*	Preserved specimen deposited in Society's Museum by Mr. G. Vidal, C.S.
5	*Trimiresurus strigatus*	One specimen contributed to the Society's Collection by Mr. H. S. Wise.
6	*Trimiresurus trigonocephalus* ...	One specimen contributed to the Society's Collection by Mr E. H. Aitken.
7	*Hypnale nepa*, the Carawala......	(1) Specimen contributed to the Society's Collection by Mr. G. Vidal, C.S.; (2) specimen contributed to the Society's Collection by Mr. H. S. Wise.
8	*Daboia Russellii*, the Chain Viper	Specimens deposited in the Karwar Museum.
9	*Echis carinata*	Specimens deposited in the Karwar Museum.

As regards the number of species found, Kanara is decidedly ahead of any other Bombay district. It is a sort of border land where the *fauna* of the densely-wooded and humid Malabar Coast is found side by side with the *fauna* of the dry and bare Deccan plains. The above list, moreover, is probably by no means exhaustive. Sooner or later other tree vipers, specially *T. anamallensis*, which has strayed from the Anamallay Hills to the Mahim Woods near Bombay, may be found in Kanara, together with other representatives of the *genus Callophis*.

But although Kanara shows a large *variety* of venomous snakes the mortality from snake-bite in that district is comparatively low. As will be seen from the statistics given further on, the deaths from snake-bite only average 0·037 *per mille per annum*. The reason for this comparative immunity is that dangerous snakes, and, in particular, the *echis*, which—as I shall endeavour to show later on—is *the* chief instrument of destruction in Western India generally, are not found in inconveniently large numbers, while the Hamadryad and the Krait are decidedly rare.

As our collections increase it is useful to take stock from time to time, however limited may be the field of inquiry selected, to see what additions have been made to our knowledge of the distribution of species. In no branch perhaps of Natural History has the distribution of species been so incompletely worked out, as in the case of the *Ophidia*. A glance at the existing works of reference will show how very little is known of the *habitat* of the great majority of the species described.

Take the case of this particular Tree Viper now received from Kanara. Günther says it is *peculiar* to Ceylon, and Theobald and Nicholson mention no other locality in which it is found. According to the same authorities, *T. anamallensis*, another Tree Viper, of which several specimens, live and pickled, have been procured by members of our Society at Khandalla and the Mahim Woods, occurs only in the Anamallays and the Wynaad. A third tree viper, *T. strigatus*, obtained in North Kanara by Mr. H. S. Wise, has previously been found only in the Nilghiris and the Deccan. Similarly, *Callophis nigrescens*, of which we have specimens both from North Kanara and Mahableshwar, occurs, according to the books, only in the Nilghiris, the Shevaroy Hills, the Wynaad and the Anamallays. Another Callophis, *C. trimaculatus*, whose *habitat*, according to the same authorities, is Tennaserim, and *possibly* Bengal, has lately been received in the Society's Museum from Colaba (Bombay) and Bandora.

In these and scores of similar instances the incompleteness of the record is not without some excuse. But the meagre account of the "Phúrsa" (*Echis carinata*), to be found in all works on Indian snakes, is less excusable. Günther says it is common in many parts of the peninsula of India, in the Anamallay mountains, and in the vicinity of Madras. Fayrer says it is absent from Bengal, common in the North-Western Provinces, the Central Provinces, Punjab, and generally in the south of India. Theobald says it inhabits North-Western and Central India, the Punjab, and Southern India, while Nicholson merely remarks that is not common but widely spread. No mention is made by any of these authorities of the extraordinary abundance in which this viper is found in Sind and the Konkan. The remarkable facts disclosed by the annual official returns showing the results of the measures taken for the extermination of venomous snakes, have been completely ignored. To show the abundance of the *echis* in the Ratnagiri District alone, I give below the number of these snakes killed and brought in for rewards during the six years, 1882-87, in that district, as compared with the total number destroyed in the Bombay Presidency the same period :—

Number of Snakes (*Echis carinata*) destroyed in Ratnagiri.		Number of Snakes destroyed in the Bombay Presidency.	
Year.	Number.	Year.	Number.
1882	238,981	1882	262,348
1883	243,675	1883	293,230
1884	167,603	1884	221,566
1885	240,158	1885	283,579
1886	208,535	1886	266,921
1887	255,378	1887	311,476
Total ...	1,354,330	Total ...	1,639,120
Average of 6 years...	225,721	Average of 6 years.	273,186

I have not at hand the figures for the whole of British India for all the above years. But I find that in 1885 and 1886, the total number of snakes killed in all India is recorded as 420,044, 417,596, respectively. Thus it may safely be concluded that of the whole number of snakes annually destroyed throughout British India, considerably more than one-half, consisting almost exclusively of individuals of the *Echis* species, are killed in Ratnagiri alone! These figures convey a very fair idea of the strength of the "Phúrsa" community in this locality, though they by no means represent the maximum possible number of "Phúrsas" which might be destroyed, if more vigorous measure were adopted. But one looks in vain for any mention of the occurrence of the *Echis* in Ratnagiri in all the books dealing with Indian snakes. It is not indeed very many years since the then head of the Bombay Medical Department, in a list of the poisonous snakes of India, with vernacular names attached, published for the guidance of District officers under the authority of Government, *omitted all mention of the Echis carinata,* and declared the "Phúrsa" of Western India to be identical with *Halys Himalayanus!*

I have assumed above that all or nearly all the snakes destroyed for rewards in Ratnagiri belong to the *Echis* species. In making this assumption, I am relying on past personal observation, as well as arguing from the natural probabilities of the case. The totals may include a few Cobras and Daboias, and possibly a few harmless snakes sometimes find their way into the bags. But the number of snakes other than 'Phúrsas' brought in for rewards in Ratnagiri is so insignificant that for all practical purposes it may be treated as a *quantité négligeable.* The truth is that no other snakes but the *Echis* are, or can be, systematically hunted and found in great numbers. A band of professional snake-charmers would think themselves lucky if they bagged a pair of cobras after a day's search in likely places. A party of Ratnagiri 'Phúrsa' catchers would curse their luck considerably, if their take of 'Phúrsas' averaged less than 50 a day. It is on record that in 1862, when the reward for 'Phúrsas' was tentatively increased from six pies to two annas a snake, 115,921 'Phúrsas' were killed and brought in for rewards in Ratnagiri within eight days (December 2nd to 10th)! At the same rate, had the reward been continued without limit as to total expenditure, five millions of 'Phúrsas' would have been destroyed in one year. But after this alarming display of zeal, the rate of reward was promptly reduced to its former level. The real truth is that notwithstanding the enormous number annually destroyed in Ratnagiri for years and years past, no really serious impression has as yet been made on the 'Phúrsas.' This is clearly shown by the fact that the mortality from snake-bite in Ratnagiri has not sensibly diminished in the last ten years. The reason is that a *limit* is fixed on the total expenditure on rewards.* The rate now in force—three pies per snake—is sufficiently high to make 'Phúrsa' hunting a profitable business. But as no rewards are paid, after the limited grant for the purpose is exhausted, the annual campaign is incomplete and ineffective, and the enemy is left in possession of the field with only such losses as can easily be repaired by the natural fecundity of its species. With the same rate of reward and no limit of expenditure, except the natural limit, when 'Phúrsas' become so rare as to make their pursuit a waste of labour, these snakes, if not quite exterminated, would soon be so reduced in numbers as to be no longer a pest and a constant danger to the population. If the campaign were *vigorously* conducted it would not, I believe, be a very long one. For a year or more the 'Phúrsas' would be killed by millions, instead of as now by lakhs, but the total expenditure would probably not exceed the aggregate and comparatively useless expenditure of the past fifteen years or so.

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* The limit some years ago was Rs. 50 per taluka per month.

I have given above some instances showing more or less excusable omissions in the record of distribution of species. But far worse than these omissions is the surprising error made by Dr. Günther himself, when he gravely states, that "no case is known of its (the *Echis*) bite having proved fatal." At the present day this statement can hardly need refutation. Even as far back as 1855-56, Dr. Imlach, then Civil Surgeon of Shikarpur, in a description of the 'Kapar' (*Echis carinata*), published in the Transactions of the Bombay Medical and Physical Society (*Vide* Vol. III., New Series, p 80), wrote that "a reference to police returns will show that in by far the greatest majority of cases serious injury and death have been caused by the bite of this species." The records of the Ratnagiri Civil Hospital for the last thirty years will tell a similar tale. But even Sir Joseph Fayrer does not seem to have had sufficient information on the subject to enable him to correct the error when he wrote his Thanatophidia. He merely states that "it (*Echis carinata*) is venomous, but Günther says its bite is not known to have proved fatal. This, I think, very doubtful. One in my possession killed a fowl in four minutes, another in two minutes, and a dog in about four hours."

There is indeed no doubt that the *Echis* is a far more potent factor than any other venomous species in swelling the mortality of the Bombay Presidency, and it is important that this fact should be more generally known and recognised than it has been hitherto. It is, of course, impossible to show the exact percentage of the deaths from snake-bite for which the *Echis* is responsible. In the returns no attempt is made to discriminate the species to which the recorded deaths are attributable, and little if any reliance could be placed in the statistics, even if such an attempt were made. But the conclusion stated above may, I think, be fairly drawn from the fact, which is very clear from the returns in their present shape, that in all those districts (*e.g.* Sind and Ratnagiri), where the *Echis* is known to abound, the average mortality from snake-bite is *markedly* high, while conversely, the mortality is insignificant in other districts where the *Echis* is either rare or absent. The following table, which I have compiled with some care and labour from the official returns for the eight years, 1878—85, shows the population, the actual average mortality, and the mortality *per mille* of each district in the Bombay Presidency:—

District.	Population by Census of 1881.	Average actual mortality from snake-bite, 1878 to 1885.	Average mortality per mille, 1878 to 1885.
Hydrabad	754,624	181·7	0·247
Thar and Parkar	203,344	48·7	0·239
Karachi	478,688	87·2	0·182
Ratnagiri	997,090	154·5	0·155
Thana	908,548	108·8	0·119
Panch Mahals	255,479	30·5	0·119
Shikarpur	852,986	72·8	0·085
Surat	614,198	41·5	0·067
Kaira	804,800	47·2	0·0586
Broach	326,930	19·1	0·0584
Upper Sind Frontier	124.181	6·7	0·053
Kolaba	381,649	19·8	0·052
Ahmedabad	856.324	39·6	0·046
Sattara	1,062,350	41·0	0·038
Kanara	421,840	16·0	0·037
Belgaum	864,014	30·2	0·034
Poona	900,621	18·6	0·020
Dharwar	882,907	17·6	0·019
Khandeish	1,237,231	23·1	0·018
Bijapur	638,493	11·0	0·017
Nasik	781,206	10·8	0·0138
Ahmednagar	751,228	10·3	0·0137
Sholapur	582,487	2·2	0·003

Thus three Sind districts and Ratnagiri, in all of which the *Echis* swarms in suitable localities, stand well at the top of the list with an average mortality, taking the four districts together, of ·205 per 1000. On the other hand, in the last four districts on the list, *viz.*, Bijapur, Nasik, Ahmednagar and Sholapur, the combined average mortality per *mille* is only ·0118 In other words only one man dies of snake-bite in about 100,000, in these Deccan districts, while in the *Echis*-ridden tracts one man dies in every 5,000. Daboias and kraits are probably nowhere so common in Western India as to have much appreciable effect on the mortality. But cobras are quite as common, I believe, in these Deccan districts as they are in Ratnagiri or Sind. This shows, I think, pretty conclusively that the *Echis*—and not the cobra, or any other venomous snake—is chiefly responsible for deaths from snake-bite in Bombay.

Enough has been said above to show the importance of having accurate and as far as possible exhaustive records of the distribution of species, and this applies not only to the case of the venomous snakes, with which I have particularly dealt, but to all branches of Natural History. Our Society has already done much useful work in this direction, thanks to the individual as well as collective energy of its members. But a great field is still open to collectors, and much still remains to be done in taking stock, and preparing catalogues of the numerous and valuable contributions already received.

INDIAN CATTLE.

By J. H. Steel, A.V.D.

(*Read at the Society's Meeting on 6th February 1890.*)

Not the least striking feature of life in India is the enormous importance of cattle, and the manner in which they are extensively concerned in trade, agriculture, traffic, and food supply. This is fully recognised in the religions of those peoples who are more essentially the inhabitants of India. Thus sacredness of the cow as an emblem of fruitfulness, and veneration of the bull as a symbol of generative power, are characteristic features of the Hindoo religion, and of these we see as outward and visible signs, the Nundee, or Sacred Bull, occupying an honoured place in the shrines, and the cow wandering freely through the streets, sleek and fat on grain appropriated from the baskets of not unwilling merchants. The sacred injunctions of the religion of the Hindoos seem to have been wisely designed with two aims; firstly, the preservation of cows in time of